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|---|---|
| CHAWAN, SHEELA C | |
| **ART UNIT** | **PAPER NUMBER** |
| 2625 | |

DATE MAILED: 12/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/988,704 | NARITA ET AL. | |
| | Examiner | Art Unit | |
| | Sheela C Chawan | 2625 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *20 November 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 November 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Priority*

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### *Drawings*

2. The drawings are objected to under 37 CFR 1.83(a) because they fail to show fig 29 element 122 as described in the specification on page 17, lines 15-18. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of

any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibata et al., (US. 6,193,132 B1), in view of Nishimaki et al., (US.5, 566,876).

As to claim 1, Shibata discloses a method for correcting ICs inclination for each of the ICs on semiconductor wafer (note, correcting IC inclination on semiconductor wafer based on two images, the first and the second image which are picked up by two

cameras fig 1, element 14 and 16 and these two images are evaluated for inclination correction. The inclination correction angle is determined before the semiconductor chip is bonded, column 4, lines 12- 25, column 8, lines 1-11), comprising:

recognizing a first detection point (note, first detection point is based on the image of the lower surface, fig 1, element 15 of the semiconductor wafer before it is bonded, column 4, lines 25- 37, column 4, lines 60- 65) for recognition (column 4, lines 66-67, column 5, lines 1-12) on recognition (note, recognizing first detection point is based on the image of the lower surface, fig 1, element 15 of the semiconductor wafer before it is bonded, column 4, lines 25- 37) and a second detection point on the semiconductor wafer (note, the second detection point is obtained by the same camera from a reference point c, (column 5, lines 1-11), it also states that the measurements are taken in X and Y directions . The inclination correction is made after comparing with an image memory available, (column 6, lines 18- 21) by moving an image pickup camera along mutually orthogonal X and Y directions (note, the substrate is moved in X-axial or Y- axial direction to correct an inclination deviation, comparing with stored alignment data as shown in fig 1 does this).

Shibata is silent about specific details of correcting an inclination of all ICs on the semiconductor wafer with respect to the X and Y directions by turning the semiconductor wafer on a basis of a result of the recognition.

Nishimaki discloses a wire bounder method for automatic inspection function for an electrode (pad) on a semiconductor chip (IC chip). The system comprises of:

correcting an inclination of all ICs (column 5, lines 29- 32) on the semiconductor wafer (note, correcting an inclination on at least one set of image data of either a first bonding point or second bonding point in the form of bonded sites, based on the positional data in which image data has been incorporated in advance, a discrepancy is detected and bonding is performed while correcting the direction of discrepancy, the camera tool distance or individual bonding reference coordinates are corrected and updated so that bonded site agrees with the proper bonded site, (column 2, lines 35- 42, column 3, lines 25- 45) with respect to the X and Y directions by turning the semiconductor wafer (column 12 , lines 35-46, column 9, lines 44-66), on a basis of a result of the recognition instead of correcting an inclination for each of the ICs on the semiconductor wafer (column 12, lines 36- 41, 43-46, column 16, lines 23-39).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Shibata to include correcting an inclination of all ICs on the semiconductor wafer with respect to the X and Y directions by turning the semiconductor wafer. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Shibata by the teaching of Nishimaki in order to improve the stability and reliability of the apparatus, while also being able to reduce space and cost (as suggested by Nishimaki at column 16, lines 24 - 38).

As to claim 2, Nishimaki discloses the IC inclination correction method according wherein, when the first detection point for (column 12, lines 35- 46) recognition deviates within a deviation area beyond a view field of the image pickup camera, the first detection point for recognition deviates within a deviation area beyond a view field of the

image pickup camera, the first point for recognition is detected by moving the view field of the image pickup camera in a serpentine manner in the X and Y directions within deviation area starting from one point among four corners of the deviation area (note moving the view field of the image pickup camera serpentine manner corresponds to X and Y direction movement away from the origin of X and Y, (column 8, lines 58- 62, column 9, lines 58-62).

As to claim 9 see the rejection of claim 2 above.

As to claim 3, Nishimaki discloses the IC inclination correction method wherein, when the first detection point for recognition deviates within deviation area beyond view field of the image pickup camera (column 9, lines 58-65), the first detection point for recognition is detected by moving the view field of the image pickup camera in the X and Y directions within the deviation area starting from center in the deviation area. This could be interpreted as spiral movement of camera (column 9, lines 58- 65).

As to claim 10 see the rejection of claim 3 above.

Regarding claims 4-5 and 11-12, Shibata discloses an IC inclination correcting method (figure 1). Although Shibata as modified by Nishimaki does not disclose expressly to move the camera 1/3 a length with respect to the X and Y direction of the view field. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to move the camera 1/3 a length with respect to the X and Y direction of the view field. Applicant has not disclosed that by moving the camera 1/3 a length with respect to the X and Y direction of the view field provides an advantage, is used for a particular purpose or solves a stated problem. One of ordinary skill in the art,

furthermore, would have expected Applicant's invention to perform equally well with either movement of camera as taught by Shibata as modified by Nishimaki the claimed 1/3 a length with respect to the X and Y direction of the view field, because both performs the same function of the movement of camera in the view fields for the purpose of capturing images.

Therefore, it would have been obvious to combine to one of ordinary skill in this art to modify Shibata and Nishimaki with to obtain the invention as specified in claims 4-5, 11-12.

As to claim 6, Shibata discloses the IC inclination correction method further comprising:

recognizing a detection point inclination correction which included in the view field of the image pickup camera together with the first detection point (column 4, lines 60- 65, 66-67) for recognition in addition to the recognition first detection point for recognition (note, recognizing the first detection point is based on the image of the lower surface, fig 1, element 15 of the semiconductor wafer before it is bonded, column 4, lines 25- 37);

obtaining a rough inclination of the ICs on the basis of the recognition of the first detection point for recognition and the detection point for inclination correction (note, reference point is used to determine X and Y coordinates of the chip in relation to the electrode locations on the semiconductor substrate, column 6, lines 24- 30, and also the substrate is moved in X- axial or Y- axial direction to correct an inclination deviation. This is done by comparing with stored alignment data as shown in fig 1);

recognizing the second detection point for recognition by moving the image pickup camera on the basis of the rough inclination (note, the second detection point is obtained by the same camera from a reference point c, (column 5, lines 1-11, it also states that the measurements are taken in X and Y directions. The inclination correction is made after comparing with an image memory available, column 6, lines 18- 21).

As to claim 13 see the rejection of claim 6.

As to claim 7, Shibata discloses the IC inclination correction method, further comprising:

recognizing detection point (column 4, lines 60- 65) inclination correction which included the view field of the image pickup camera together with the first detection point for recognition, detection point for additional recognition first recognition (note, recognizing first detection point is based on the image of the lower surface, fig 1, element 15 of the semiconductor wafer before it is bonded, column 4, lines 25-37);

obtaining rough inclination data based of the recognition of the first detection point for recognition and detection point inclination correction (note, correcting inclination deviations for each of individual IC as taught by reference Shibata at (column 4, lines 60-67; column 6, lines 18- 21); and

recognizing the second detection point for recognition by moving the image pickup camera on a basis of the rough inclination (note, the second detection point is obtained by the same camera from a reference point c, (column 5, lines 1-11), it also states that the measurements are taken in X and Y directions. The

inclination correction is made after comparing with an image memory available, column 6, lines 18- 21), also correcting IC inclination on semiconductor wafer based on the first and the second image which are picked up by two cameras (fig 1, item 14 and 16) and these two images are evaluated for inclination correction. The inclination correction angle is determined before the semiconductor chip is bonded (column 4, lines 12- 25, column 6, lines 25- 30).

As to claim 14 see the rejection of claim 7 above.

As to claim 15 see the rejection of claim 7 above.

As to claim 8, Shibata discloses apparatus for correcting ICs inclination on a semiconductor wafer which (note, correcting IC inclination on semiconductor wafer based on two images, the first and the second image, which are picked by two cameras fig 1, element 14 and 16 and these two images are evaluated for inclination correction. The inclination correction angle is determined before the semiconductor chip is bonded (column 4, lines 12- 25) comprises:

a recognition device, which includes an image pickup camera freely movable in mutually orthogonal X and Y direction above semiconductor wafer imaging (fig 1, element 16 which moves together with bonding tool 12 as an integral body, column 4, lines 4- 6);

a first detection point for recognition (note, recognizing first detection point is based on the image of the lower surface, fig 1, element 15 of the semiconductor wafer before it is bounded, column 4, lines 25- 37, column 4, lines 60- 65) and second detection point for recognition on the semiconductor wafer (note, the second detection

point is obtained by the same camera from a reference point c, column 5, lines 1-11, it also states that the measurements are taken in X and Y directions. The inclination correction is made after comparing with an image memory available, column 6, lines 18-21), and detects an inclination of ICs on the semiconductor wafer with respect to the X and Y directions on a basis of picked up image information obtained by the image pickup camera (note, the substrate is moved in X- axial or Y- axial direction to correct an inclination deviation and comparing with stored alignment data as shown in fig 1, column 4, lines 12- 24 does this);

a control device (note, control unit to correct the IC inclination see fig 1, element 20 where the movements in X, Y direction is defined, column 7, lines 16- 28) for controlling to drive the turning device on the basis of inclination information of the ICs detected by the recognition device so as to turn the semiconductor wafer loaded on the wafer turning member in order correct the inclination on semiconductor wafer instead of correcting an inclination for each of the ICs on the semiconductor wafer (note, the control unit to correct the IC inclination fig 1, column 4, lines 12-37, column 6, lines 25-30).

Shibata is silent about a wafer turning member on which the semiconductor wafer loaded and which turned a circumferential direction of the loaded semiconductor wafer;

turning device for turning the wafer turning member in the circumferential direction;

Nishimaki discloses wire bonder and wire bonding method. The system comprises of:

a wafer turning member on which the semiconductor wafer is loaded and which turned in a circumferential direction of the loaded semiconductor wafer (note circumferential direction corresponds to deviation correction, see column 12, lines 35-47).

turning device turning the wafer turning member in the circumferential direction (column 12, lines 35-47).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Shibata to include a wafer turning member on which the semiconductor wafer loaded and which turned in a circumferential direction of the loaded semiconductor wafer; turning device turning the wafer turning member in the circumferential direction. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Shibata by the teaching of Nishimaki will result in recognizing other corners of Shibata 's semiconductor chip 13 (equivalent to turning the chip in a circumferential direction) and consequently enhancing inclination correction (as suggested by Nishimaki at column 16, lines 24 - 38).

***Other prior art cited***

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Saitoh et al., (US. 5,644,245 ) discloses probe apparatus for inspecting electrical characteristics of a microelectronic element.

Hikita et al., (US.6,476,499 B1) discloses semiconductor chip, chip-on-chip structure device and assembling method thereof.

Yamashita et al., (US. 6,445,203 B1) discloses electric device testing apparatus.

Misawa (US.5,119,168) discloses semiconductor integrated circuit.

Nakazato (US. 6,070,783 ) discloses conductive ball attaching apparatus and method.

Yamamoto (US.6,284,568 B1) discloses method and system for producing semiconductor device.

***Contact Information***

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sheela C Chawan whose telephone number is 703-305- 4876. The examiner can normally be reached on Monday - Thursday 8 - 6.30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on 703-308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sheela Chawan
Patent Examiner
Group Art Unit 2625
December 23, 2004